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BUREAU OF INDIAN STANDARDS

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Indian Standard

RECOMMENDATIONS FOR INSPECTION, TESTING AND MAINTENANCE OF HYDRAULIC HOIST (AFTER ERECTION) *[FIRST REVISION TO IS 13041]*

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Last date for receipt of comments is 30-09-2010

FOREWORD

(Formal clauses to be added later)

The hydraulic hoist should be properly maintained through periodic inspection to ensure intended operation of gate leaves at all times. This standard is being prepared with a view to providing guidance for proper inspection, testing and maintenance of hydraulic hoists.

The hoists of gates should be properly maintained through proper inspection to ensure smooth operation of gate leaves at all times, and to keep good maintenance. This standard is being prepared with a view to providing guidance for proper inspection, testing and maintenance of hydraulic hoists.

This standard was first published in 1991; however, the Committee responsible for the formulation of this standard decided to revise it based on the experience gained *since then* as well as considering technological development in the field.

The revised draft for the standard was prepared by R M Sinha & Co., Kolkata and NHPC Ltd.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*).’ The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

1.1 This standard lays down the recommendations for inspections, testing and maintenance of hydraulic hoist. This standard may be read in conjunction with IS 10210 for better appreciation of various terms and definitions.

2 GENERAL

2.1 The performance and life of Hydraulic hoist is directly dependent on gate which is coupled to the hoist and as such the gates should be kept in good condition at all times.

3 INSPECTION AND TESTING

3.1 Points to be checked before putting hydraulic hoist into first operation:

a) Before first fill of oil, check the cleanliness of the entire hydraulic oil pipe line circuit by blowing preferably with dry air.

b) The entire hydraulic pipe line system should be tested at 1.5 times of the opening pressure with oil using a hand pump or an external motor driven hydraulic pump for 30 minutes (minimum). It should be inspected for leakage and rectify the same, if any.

c) Flushing of pipes with oil/ flushing fluid should be done after installation before connecting to hydraulic cylinder. Flushing fluid should be compatible with the hydraulic working fluid.

d) Before putting on the drive motors oil level in tank should be checked and to be filled-in or top up to be done upto adequate level. Actuate the directional valves to operate the hoist until one operation is completed. Pumps, valves, hydraulic cylinders, pipe and pipe fittings should be properly cleaned.

e) Before first running, check that all valves are in normal position as represented in the hydraulic diagram. Ensure the setting of pressure relief valves/ safety valves, pressure switches, temperature controllers and pressure unloading valves to the prescribed value.

f) Check that all electrical connections in between electrical control panel to power pack, limit switches and position are in accordance with electrical circuit diagram.

g) Voltage of control circuit should be checked.

h) In case shut off valve is provided between tank and pump suction line, it must be ensured that it is kept fully open to prevent damage to the pump.

i) Insulation resistance of the power pack motors should be checked before connecting to power source. Energize with electric power and the motor should be inched to check the direction of rotation of motor. The direction should be corrected, if necessary.

j) When the motor is put on, raise the system pressure slowly to its working pressure. The relief valves, solenoid valves and directional valves should be adjusted for the working pressure.

k) Actuate the directional valves to operate the hoist until one operation is completed.

3.2 Periodical Inspection and Testing

a) Periodical inspection of hydraulic hoist and power pack shall be carried out to detect leakage of oil, if any. It shall be done as and when necessary, but at least once a year prior to the onset of monsoon/ high flood season. The hoists should be operated up and down several times to make sure that system is in order.

b) The control panel should be energized and all the alarms, interlocks and trip logics provided by the power pack manufacturer should be tested.

c) The strip heater provided inside the control panel should be checked and tested for its functioning.

d) Functioning of limit switches / proximity probe, pressure switches and indication lamps should be checked for proper working.

e) Pumps, valves, hydraulic cylinders, pipe and pipe fittings should be properly cleaned.

f) Removing / Bleeding the air from the hydraulic cylinder should be done through vent valve at the time of commissioning or re-commissioning of the Hydraulic Hoist.

g) The hydraulic hoist system should be run for at least 5 to 6 cycles on load. Joints and fit-tings should be tightened in no load condition, where leakages appear at the time of commissioning / recommissioning or during running. All the pipelines are to be checked for vibration-free condition, tightness of fittings and bolting and tight seat of pipe clamps.

h) Operating temperature in the oil tank and bearing of the pump should be checked.

i) The alignment of pump-motor set should be checked regularly.

j) Breather screws should be checked. It should be loosened and after clear oil free from foaming and air comes out, it should be tightened.

k) Hoist Supporting Structures should be checked particularly against deformation, crack and corrosion etc. in every six months for outdoor installation and once in a year for indoor installation. This checking should also be done before commissioning / re-commissioning of the Hoist system.

l) Tightness of all the fastners of hoist structure and hoist components should be checked at least once in a year.

m) Gauges should be checked and re-calibrated, once in two years.

n) The main oil and head tank should be checked against leakage, contamination or deposit of sludge. These should be kept absolutely cleaned and free from water.

o) Hoses should be inspected once in six months and replaced, if required.

p) All warning & safety indicators (alarm) should be checked once in a year.

q) Hoist stem should be inspected once in a year for pitting or corrosion.

r) All the pipe joints should be checked and tightened if found loose.

s) The quality of oil should be checked twice a year. Checking of oil can be done by placing a drop of oil taken from the system on white filter paper. If the oil is good, a clear spot occurs whereas aged oil leaves dark spot which becomes larger and darker. The strainer and filter should be checked up against contamination.

t) Condition and effectiveness of hand pump should be checked and to be attended if required.

u) Creep setting should be checked and if found necessary, should be adjusted suitably.

v) Crack opening if any, should be checked and to be adjusted if found necessary.

w) Functioning of dampening / cushioning devises should be checked and to be adjusted if found necessary.

x) Emergency Closing: Beside normal closing, the emergency closings should also to be checked and ensured.

y) The run out of the piston rod should be checked once in a year.

4 PERIODICAL MAINTENANCE

4.1 The maintenance of hydraulic hoist mechanism should be done regularly. Reference should be made to manufacturer's instructions for detailed maintenance and servicing of hoists. Proper record of inspection, testing and maintenance should be made by the project authority.

4.2 The following maintenance works should be attended to:

a) *Seals* : Only 'O' rings, copper sealing, teflon tapes and the like are suitable as sealings. In no case hemp and puttey be used as sealings material.

b) *Oil* : Viscosity and contamination of oil should be checked once in a year and the oil to be replenished if necessary. Oil should be cleaned and dried at regular intervals by engaging centrifuge with drier or by any other suitable method. Independently from the simple inspection, a laboratory investigation should be done every 2 years. If oil change is necessary, the total hydraulic oil has to be drained. The oil tank has to be cleaned and pipelines shall be occasionally flushed.

c) *Pipe and pipe connections:* Pipes should be thoroughly cleaned prior to installation by weak acid or by dry cleaning. Flushing of pipes with oil/ flushing fluid should be done after installation and repair before connecting to hydraulic cylinder. Before commissioning/re-commissioning the entire hydraulic pipe line system should be tested at 1.5 times of the opening pressure with oil using a hand pump. It should be inspected for any leakage which shall be rectified. It may be ensured that the pipe connections shall be made with high pressure fittings or flanged joints with 'O' rings or welded blocks. Special attention should be paid to the absolute tightness of fittings and boltings. At least every six months the hydraulic hose lines shall be checked. If the rubber seems to be brittle and shows cracks, the hose line has to be replaced immediately.

d) Repairs and replacement of electrical relays, controls and solenoid valves, limit switches / proximity switches should be attended to.

e) Suspension devices of cylinder should be kept suitable greased.

f) If there are unusual sounds in the stuffing box, cylinder stem should be lubricated. If the sound persists further investigation shall be made.

g) One set of pump-motor should run alternatively to other set for certain period as programmed by the Project authority so as to keep all are in running / working condition. Smooth running of pumps is to be observed. Excessive and abnormal development of noises means defect in bearings or other damages. The respective pump should be replaced/ repaired.

4.3 A typical inspection and maintenance schedule is given below:

SUGGESTIVE INSPECTION AND MAINTENANCE SCHEDULE FOR HYDRAULIC HOIST

Item	Maintenance Operation	Maintenance Interval
Hydraulic Cylinder	Visual Inspection for leakage Visual Inspection of Scraper and Piston Bleed Out Air Operation of the hoist Visual Corrosion Inspection	15 days 3 months 3 months 6 months 12 months
Cylinder Bearings	Lubrication & Visual corrosion Inspection	12 months
Pipe and flexible hose line	Visual Inspection (check corrosion, tightness, fixing of the pipes and ageing of rubber parts)	6 months
Hydraulic equipment (Valves, Gauges)	Visual Inspection and cleaning	monthly
Pumps	Check smooth running	monthly
Moist air absorber	Visual Inspection	monthly
Oil filter	Visual Inspection	3 months
Oil inspection and oil change	Visual Inspection Send oil sample to laboratory	12 months 24 months